THE 'I' IN TEAM: EFFECTS OF PERFORMANCE APPRAISAL TYPE ON TEAMWORK VARIABLES

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ABSTRACT

The following research examined the effects of performance appraisal condition on teamwork variables. As more reliable models of teamwork emerge, there remains a noticeable lack of information regarding team motivation and feedback in an organizational context. This paper first reviews the current findings on team motivation, feedback, and performance appraisals and then applies that topic to teamwork processes. The researcher proposed that individual, team, and dual (individual and team feedback) performance appraisals would have different effects on teamwork processes and performance. Positive effects on team orientation, mutual trust, and team performance in the team and dual performance appraisal conditions were hypothesized. Main effects for condition emerged but they were not as predicted; those in the individual condition had the highest scores on teamwork processes. There were no significant differences in team performance. Possible explanations as to why the findings were not as predicted are suggested and directions for future research are provided.

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CHAPTER ONE

INTRODUCTION

Two of the major trends of the 21st century workplace revolve around teams. Specifically there has been rapid growth in the use of teams and a movement towards team-based work designs (Devine, Clayton, Phillips, Dunford, & Melner, 1999; Lawler, Mohrman, & Ledford, 1992; Morgeson, Johnson, Campion, Medsker, & Mumford, 2006). Teams help organizations to be more competitive, to keep an edge in today's knowledge market, and to compete in the ongoing war for talent. Productivity research has shown that a properly implemented team-based approach produces superior results for companies: from improving morale and performance to increasing quality and shareholder return (Fisher, 1994; Mohrman, Cohen, & Mohrman, 1995). Teams have also been shown to empower and benefit workers (Salas et al., 2005). However, these benefits don't just occur because people are placed into teams. Organizations need their team members to participate in effective teamwork to achieve whatever team goal the company has in mind. In the current teams literature, the effects of performance appraisals on teams have been overlooked. Performance appraisals are intended to provide employees with a source of motivation and usually serve as a basis for rewards or punishments for their performance. These appraisals are often conducted only at the individual level. Due to these aspects of performance appraisal they likely have an effect on teams and teamwork processes. However, performance appraisal effects on teamwork have not received much specific attention in the organizational psychology literature. The present study attempted to address the lack of coordination in these current literatures and proposed different teamwork effects for

different performance appraisal conditions (individual, team, and dual – both individual and team).

Groups and Teams

Team and group research were once solely domains of social psychology. However, in 1990, Levine and Moreland noticed that this research had become vital to organizational psychology. These origins have led to there being many different definitions of work teams (and work groups) used across the spectrum of organizations, practitioners, and academics. This issue with construct definition has been cited as one of the possible causes for the many contradictions in past teams research (Kozlowski & Bell, 2003; LePine, Piccolo, Jackson, Matheiu, & Saul, 2008). For the purposes of this paper, a comprehensive definition of work teams will be used, taken from Kozlowski and Bell's review completed in 2003:

> Two or more individuals who: (1) Exist to perform organizationally relevant tasks, (2) share one or more common goals, (3) interact socially, (4) exhibit task interdependencies, (5) maintain and manage boundaries, and (6) are embedded in an organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity. (p. 334)

Teamwork

The first step to understanding teamwork is to recognize that all cognition originates within the individual. From that initial stance, researchers are intent on deducing how being a member of a team affects individual cognitive processes and the processes that emerge at the team level (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Teamwork is usually viewed as a set of interrelated thoughts, actions, and feelings of each member that are

needed for the individual members to function as a team. These combined thought, actions, and feelings facilitate coordinated, adaptive performance and task objectives which are intended to result in value-added outcomes (which are the goal of using teams vs. individuals). Salas, Sims, and Burke (2005) reviewed the findings on teamwork and came up with a model that consisted of core components of teamwork and their supporting coordinating mechanisms, see Figure 1. The core components were team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation. These components are considered to facilitate effective teamwork processes; however, they need the following supporting mechanisms to function at peak: shared mental models, closed-loop communication, and mutual trust. Prior to this theoretical development, most models of team effectiveness did not specify what teamwork processes were (e.g. Stevens & Campion, 1994; Marks, Mathieu, & Zaccaro, 2000). Salas, Sims, and Burke's (2005) taxonomy focused on those elements that were considered most important for team performance which they conceptualize in the model as team effectiveness. One of the central arguments of their review is that a team can be guaranteed success and high levels of

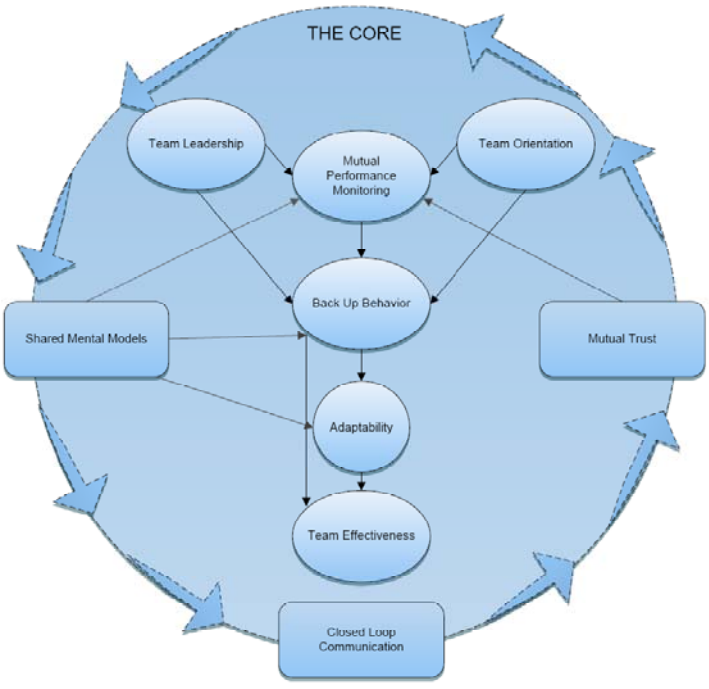


Figure 1: Reproduction of Graphical Representation Of High-Level Relationship Among the Big Five and the Coordinating Mechanisms Including Research Propositions From Salas, Sims, & Burke (2005)

performance if they engage in both the supporting mechanisms and core processes of teamwork.

Salas et al. (2005) provide detailed definitions of each of these teamwork components and detailed behavioral anchors but, for the purposes of this study, succinct explorations are provided here. Team leadership generally refers to a leader who is able to coordinate, motivate, and assess the team performance among other teamwork enhancing tasks. Mutual performance monitoring is an ability to monitor one another's performance and apply task strategies when needed. Backup behavior is an ability to anticipate and help other team members, or to shift workloads when needed. Adaptability refers to a team's ability to adjust when needed (this can mean backing up others). Team orientation is considered by some to be a state-like rather than a trait-like individual difference (Salas et al., 2005) that reflects acceptance of team norms, cohesiveness of the group, and self-awareness as a team member. There is a possibility that it is trainable and based on past team experiences, expected outcomes, and perceptions of the person's ability to complete the task. Findings have shown that those with a high level of team orientation assign a high priority to team goals and possess a willingness to participate in team activities. Higher team orientation results in increased coordination and cooperation, which facilitate team performance and many other teamwork processes in this model. Shared mental models refer to a shared understanding or knowledge about how members will interact and relationships about the task. Mutual trust concerns the shared perception that individuals in the team will perform particular actions important to the group, and is thought to affect a variety of team processes. Trust fosters a willingness to share information more freely throughout the team (Salas et al., 2005). Mutual trust is considered extremely important within the task because it

affects how an individual interprets other team members' behavior. If a negative attribution is made (such as that another team member is acting out of self interest or is thought to be loafing) this usually leads to a negative spiral of team functioning. Finally, closed loop communication is concerned with the exchange of information between team members and is facilitative of many other teamwork processes, though the chance of it being positive and occurring are dependent on the core processes of the model (such as team orientation and mutual trust).

Team Motivation

One of the major issues with teamwork is that it is often plagued by motivation and coordination problems (Karau & Williams, 1993). One way that researchers have sought to explain these phenomena is by applying individual motivational theories to those who are in teams. There are hundreds of studies demonstrating the reliable impact of goals on individual behavior (Locke & Latham, 1990, 2002) and many theories focus on increasing an individual's motivation through some form of goal setting, which, in turn, improves individual performance (e.g. Resource Allocation Theory: Kahneman, 1973; Kanfer & Ackerman, 1989; Norman & Bobrow, 1975; Self-Regulation Theory: Vancouver, 2000; Goal-Setting Theory: Locke & Latham, 2002).

While it is possible to intuitively hypothesize how each of the afore-mentioned goal-setting theories has applications to the perceived construct of team goals, how do we define team goals? Locke and Latham (2002) define goals for both individuals and teams in the following way: "A goal is the object or aim of an action, for example, to attain a specific standard of proficiency, usually within a specified time limit." (p.705) Furthermore, in their

2005 study, Aube and Rousseau stated that, "In work settings, a team goal generally refers to the level of task outcomes that team members have to achieve" (p.189).

Using these two definitions, it can be said that a team goal establishes the threshold of success explicitly, and setting a goal at the team level means that the teams must reach the stated goal collectively, therefore connecting team goals to the performance or effectiveness of the team. Several studies support this premise that group goal setting improves team performance (DeShon et al., 2004; Durham, Locke, Poon, & McLeod, 2000; Wegge, 2000; Wegge & Haslam, 2003; Wegge & Haslam, 2005). Group goal setting led to higher performance than individual goal setting through increased goal difficulty and enhanced acceptance of assigned individual goals (Matsui, Kakuyama & Onglatco, 1987). In a meta-analysis examining 26 effect sizes (10 studies, 163 groups) from between 1978 and 1991, it was found that performance of groups working towards a specific and difficult group goal performed almost one standard deviation higher (d = .92) than those without clear goals (O-Leary-Kelly, Martocchio, & Frink, 1994). Locke and Latham (2002) feel that this meta-analysis demonstrates that goal-setting theories, though originally designed for and from individuals, are applicable to teams. Team goals research also shows team performance is affected by the level of congruence between individual, team, and organizational sources of motivation (Locke & Latham, 1990) which leads us into our next section on team rewards and then into the final section on team feedback and performance appraisals.

Team Rewards

Attempts to apply the knowledge about individual motivation, goals and rewards to the team level have produced very mixed results (DeMatteo, Eby, & Sundstrom, 1998). Fit among goals and pay-for-performance plans of feedback produces more effective teams

than those that do not have congruent goals that coordinate with the performance plans (van Vijfeijken, Kleingelf, van Tuijl, Algera, & Thierry, 2004). In this study, they presented a model for how to combine goal setting and pay for performance effectively for groups by looking at previous research. However, they were unable to find research on how a combination of individual and group rewards (rather than feedback or goals) would affect performance, but they were also looking for information on task complexity and interdependence. Despite these issues, this finding provides support for the idea that goals and performance feedback must be assessed using the same anchors. In the teamwork literature, one of the main components missing from both Salas, Sims, and Burke's (2005) research and the recent meta-analysis findings on teamwork is the effect of rewards (LePine et al., 2008). The lack of consideration of the effect of rewards on team motivation is something this study seeks to address through the application of feedback and rewards in the form of pay-for-performance and performance appraisals.

Team Feedback

Currently, there are contradictory findings in the literature regarding what levels of feedback are the most effective at motivating teams – team feedback only, individual feedback only, or both levels of feedback. As early as 1987, Matsui, Kakuyama, and Onglatco's research suggested that team members need to receive both individual and team level feedback to be motivated. They did two studies of both individuals and pairs to arrive at these conclusions: the first study looked at pairs who set individual and group goals and the individuals who only set individual goals, the second study was done only on pairs who were given both individual and group task feedback. However, in 1992 Salas, Dickinson, Converse, and Tannenbaum clarified previous findings by showing that if people only

receive team feedback then this does not improve the performance of individuals who perform poorly. In the past, even team appraisals were seen to overemphasize the individual and underemphasize the team elements (Murphy & Cleveland, 1995) but the consensus at the time was that both levels of feedback were necessary for motivation. Resource allocation research was then conducted in 2004 which had surprising results (DeShon et al.). In this particular study, they were working to justify a multilevel model multiple-goal perspective of the effects of feedback on self-regulatory processes. This approach was validated by their research and from this they were able to conclude the following: those who only received individual feedback focused on their individual performance, those who received only team feedback focused on their team performance, and those who received both were unable to capitalize on the feedback. Since that time, there has been some pertinent research on feedback in virtual teams with findings stating that team feedback was associated with positive effects on team motivation, satisfaction, and performance (Geister, Konradt, & Hertel, 2006). This particular study was focused on validating a measure for the selection and placement of virtual team members, so these findings were not the focus of the study; therefore, only very general information regarding conceptualization of these variables was available. These conflicting current views are one of the main reasons this study is going to be looking at all 3 different feedback conditions in an attempt to provide clarity for these issues.

Teams and Performance Appraisals

In the current literature on teams, many researchers refer to feedback, goals, rewards, and performance appraisals in the same dialogue. Performance appraisals are often seen as a method for providing feedback and rewards for meeting performance goals, all of which

have been linked to motivation in previous research. In most organizations, individuals are appraised without specific mention of their team involvements, and bonuses and other rewards are based on these individual appraisals. These appraisals often function as a method of assessing a person's performance and a determining factor in their rewards, usually in the form of a pay-for-performance plan such as a bonus. In fact, many employees serve on teams, but their performance on the team may or may not even come up specifically in their performance appraisal. Despite previously contradictory results in these areas of team research this study is based on the idea that rewarding individual effort for those who work in teams undermines the process of teamwork and therefore team performance.

Hypotheses

Prior to stating the hypotheses for this study, it is imperative to review Salas et al.'s (2005) model of teamwork. Please see Figure 1 for reference to this model. The sum of that model of teamwork was that the team can be guaranteed success and high levels of performance if they engage in both the supporting mechanisms and core processes of teamwork. Those core processes and supporting mechanisms are: team leadership, mutual performance monitoring, backup behavior, adaptability, team orientation, shared mental models, closed-loop communication, and mutual trust. When you examine this model for the possibility of reward effects (performance appraisal with a pay-for-performance reward component) on a self-managed team task (the task type used in this study which means no team leader will be assigned) particular mechanisms appear more likely to be affected by different performance appraisal conditions.

Team orientation. As previously stated, team orientation is viewed by some as an attitude that reflects a preference for working with others and a tendency towards teamwork functions (Salas et al., 2005), and is often conceptualized as an individual difference variable. *Hypothesis 1: Team orientation will be significantly higher in the team and dual (both team and individual) performance appraisal conditions than in the individual performance appraisal condition.* Due to the conceptualization of team orientation as an individual difference variable, it is the only variable that will also be tested prior to any team activities. It is possible that the team performance appraisal will result in the highest effects on the teamwork variables but there are no a priori methodological reasons to distinguish between the team and dual conditions at this time. Therefore, potential differences between team and dual performance appraisals are purely exploratory.

Mutual trust. As previously stated, mutual trust concerns the shared perception that individuals in the team will perform particular actions important to the group, and is thought to affect a variety of team processes. In reviewing the model (Salas et al., 2005), it becomes clear that this variable is the basis for two of the other core components of teamwork (shared mental models and closed loop communication) and contributes to all of the coordinating mechanisms.

Hypothesis 2: Mutual trust will be significantly higher in the team and dual performance appraisal conditions than in the individual performance appraisal condition.

Team performance. Salas et al. (2005) proposed that team orientation also affects team performance by influencing individuals' acceptance of feedback and assistance from team members (backup behaviors). Mutual trust can affect team performance due to its effects on teamwork processes like group participation, contribution, and product quality (Salas et al.,

2005). So, while there has not been shown to be a direct relationship between team orientation, mutual trust and individual performance, due to the previously stated concerns under the previous hypotheses, these variables are still expected to affect team performance. Because the dual performance appraisal condition reinforces effective teamwork, it was expected to result in higher levels of team performance.

Hypothesis 3: Team performance will be significantly higher for the team performance appraisal condition than in either the individual or dual performance appraisal conditions.

CHAPTER TWO

DESIGN AND METHOD

The independent variable in the current study was type of performance appraisal, where teams of participants underwent an individual, team, or dual (individual and team-level feedback) performance appraisal. The dependent variables were team orientation, mutual trust, and team performance, though other teamwork processes from the Salas, Sims, and Burke (2005) model of teamwork were measured for exploratory analysis. These exploratory variables (team leadership, mutual performance monitoring, backup behaviors, adaptability, shared mental models, and closed loop communication) were assessed as part of the Modified Team Factors Questionnaire and will be discussed in greater detail in the materials section.

Pilot Study

Prior to the finalization of the study, there were several aspects of the experiment which needed clarification. A small study (N=62) was conducted in an undergraduate psychology course to see how students interpret sales data based on presentation as well as to gather data on gender and team orientation. Participation involved looking at sales information and answering survey questions based on the data as well as filling out a separate survey on team orientation and gender. The sales information was presented in both table and graph format and was designed to determine if the students could assess a seasonal sales pattern by product. Those participants in the graph condition did identify the pattern (28) more often than those in the table condition (18), however, their estimates of profit for the products were not significantly more accurate, $t(118) = -0.746$, $p = .457$. This study helped us to

decide how to present past sales information for the business simulation task to the teams. It also helped us to determine how much noise (variability) to keep in the profit margins of the products in the program – product B had more noise but this did not affect the profit estimate accuracy either, $t(121) = 4.381$, $p = 2.527$. No gender differences were identified for team orientation, $t(57) = -2.002$, $p = .412$. Finally, this pilot study helped us to decide not to collect any demographic information beyond identification (to facilitate performance rewards) because no a priori reasoning for demographic data collection was established.

Design

The study was a repeated measures design. Team orientation (TO) was measured three different times, due to theoretical indications that it could operate at a state and trait level. Mutual trust (MT) was measured twice, and performance measurements were recorded by the program throughout the experiment. See Figure 2 to the right for a sample timeline of an experiment session with indications of when these measurements were taken for further clarification.

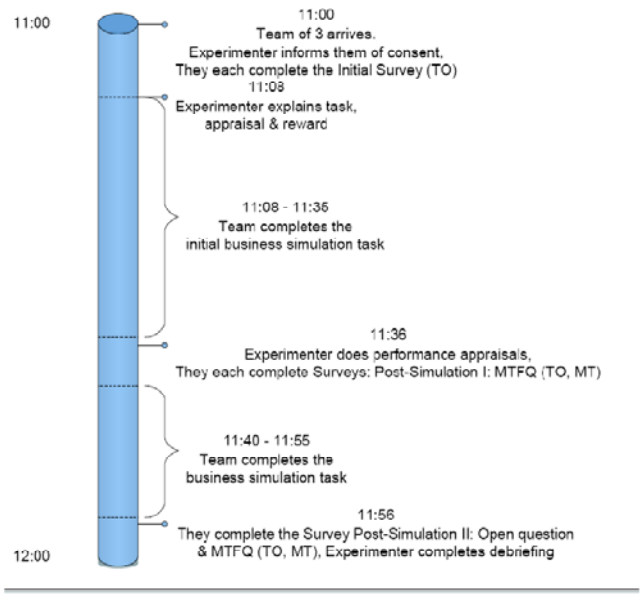


Figure 2: Sample Timeline of Experiment Session

Participants

Participants for this study were a sample of 54 graduate and undergraduate students, most of whom were enrolled in psychology and sociology courses at a mid-sized public university in the eastern United States. Demographic data were not collected for the

participants beyond identification information for the reward component of the study due to a lack of theoretical basis for demographic effects on the variables of interest. Prior to signing up for the experiment, it was indicated that participants needed to be fluent in English. Questions were asked regarding major but these data were only examined to check against performance for those who might have had a greater understanding or proficiency at the task than others (no business or computer related majors participated, no other possible exceptions were noted). Two questions attempted to measure the relationship of participants to one another ("Have you shared a class?", "If you had a party would you invite them?"). Experimenter observations of the participants while answering these questions led to doubt about the validity of their measurement. Often students who had signed up independently to participate came in to the room and introduced themselves to one another then indicated they would invite one another to their party. These questions were subsequently not analyzed. Participants were grouped into teams of 3 based on the time they signed up for participation, which resulted in 18 teams participating in the study. The decision to accept this sample size was supported by a power analysis (Lenth, 2006). This power analysis indicated that the hypothesized connection to team performance of 1.18 (*d*) would provide an 84% chance of obtaining statistical significance at the .05 level for the overall *F*-ratio.

Materials

Captain of Industry. A business simulation program (hereafter referred to as COFI) was used to provide the team with an appropriate task. The program was a business simulation where the players act as the CEO and make resource allocation decisions to affect performance as well as get results based on that performance, see Figure 3 for a screenshot. This program is loosely based on a classic strategy and resource allocation computer game known as *Hamurabi* (Ahl, 1978). The team was provided with a printed excel table tracking past numerical decisions and outcomes for the past 5 years (see Appendix A) to help them make more informed decisions which also included guidelines on how much money to put towards Administration and Research & Development. They were also provided with an excel calculator to help them add up their intended budget prior to implementation, see Appendix B for a screenshot. The basic premise of the simulation was to decide which product lines sell best in which quarter, and allocate more production (and less marketing) during those times. The team interacted with this software based on their allocation decisions, from the initial $150,000 amount available, and received the subsequent performance results in the report for each season at the bottom of the screen. The results were also communicated to the supervisor, the experimenter, by means of a saved file created by the program that logged all

Figure 3. Captain of Industry Screenshot

exact inputs and the subsequent outcomes. According to the condition of the experiment the individuals were instructed to use the business simulation in different ways. In the individual performance appraisal condition, they were each assigned a particular product to be responsible for as an individual. In that condition, their performance and reward was assessed on only that product's profit. In the dual (individual and team) condition, each person was assigned a product to be responsible for but the team was also responsible for the overall company profit. They were appraised according to both separate performances and there were both individual and team rewards possible. In the team condition, no one was assigned any product, they were appraised based on the company profits and the possible rewards were based on the team performance. In summary, in every condition the team had to make decisions together (Administration, Research & Development), but in those conditions with an individual component different members had specific responsibilities (Product A,B, or C) within the team task.

Modified Team Factors Questionnaire. The Modified Team Factors Questionnaire (hereafter referred to as the MTFQ) originally measured the following variables of interest: team orientation, team leadership, mutual performance monitoring, backup behavior, adaptability, shared mental models, closed loop communication, and mutual trust and was developed by a graduate-level selected topics class. It was originally created for Mobile Operations in Urban Terrain (MOUT) use for pre and post training and was theoretically based on Salas, Sims, and Burke's (2005) model of teamwork. Prior to use in this study, it was revised for non-MOUT usage. At that time, the team orientation questions were moved into a separate questionnaire due to team orientation lending itself to both pre and post testing (i.e. team orientation is viewed as more of an individual differences variable that does not require prior

experience working with your team). The team orientation questions were used separately in the initial survey (see Appendix C) and also re-integrated into the MTFQ (for the second and third surveys administered in this study, see Appendix D and E respectively). The entire MTFQ is composed of 37 items which cover all of the aforementioned teamwork variables. Items are rated on a 5-point Likert scaled with the following anchors: 1 = *strongly disagree* and 5 = *strongly agree*. Total scores for each variable were created by reverse scoring appropriate items, adding up the items, and dividing by the number of items included for that variable. Total scores could range from 1 to 5 with higher scores indicating higher levels of each variable. Reliability analyses were conducted by Switzer (2005) using data from students participating in team projects and the Cronbach alphas were as follows: team orientation =.78, team leadership = .70, mutual performance monitoring = .52, backup behavior = .70, adaptability = .74, shared mental models = .64, closed loop communication = .70, and mutual trust = .53.

Individual and Team Performance. COFI data were used to assess the performance of each individual and team. Individual performance was measured by looking at the specific product profit each individual was assigned if they were in a condition with an individual component. Team performance was measured by looking at the company profit which was a function of teamwork.

Performance Appraisal Condition. As stated in the previous section, COFI data was used to assess the performance of each individual and team where appropriate. Depending on the condition assigned (based on the time slot participants sign up for), particular teams received individual feedback, team feedback, or both. This information was used by the experimenter to provide corresponding verbal performance appraisals to the participants. Please see the

performance appraisal scripts (See Appendix F) to view the different potential appraisals for different combinations of condition and COFI output.

Manipulation priming. To prime the performance manipulation, the participant was asked to check the appropriate item at the end of their demographic survey and at the start of the second survey ("I will be assessed on my individual performance"; "I will be assessed on the team's performance", see Appendix C and D). Prior to the debriefing, they were also asked two additional items ("In this scenario, the experimenter's evaluation of my performance was based on the team's performance"; "In this scenario, the experimenter's evaluation of my performance was based on my individual performance", see Appendix E).

Task description. Prior to the final MTFQ administration in the last survey, an open-ended question ("Please provide a quick description of how you and your team completed the tasks.", see Appendix E) was asked with the intention of a word analysis for the number of I and Team oriented words by condition.

Procedure

Data were collected from teams consisting of 3 participants. Sessions were assigned to one of the three experimental conditions - individual, team, or dual performance appraisal - based on the order sessions were scheduled in.

The same female experimenter ran all participants. Upon arriving, participants read and signed the informed consent, and then they answered a set of questions as well as the team orientation portion of the MTFQ (see the Initial Survey, Appendix C). Next, participants received general instructions about the task and were informed that they would be completing the business simulation as a team (see Appendix D for the Experiment Script). Following this instruction, participants were informed of their performance appraisal

condition and possible rewards for performance involved in this study. Those in the individual performance appraisal condition had the possibility of a $10.00 reward for the highest individual performance in the study. Those in the team performance condition had the possibility of splitting a $30.00 reward for the highest team performance in the study. Those in the combined appraisal condition had the opportunity to receive both $10.00 for the highest individual performance in the study, and $30.00 for the highest team performance in the study. Participants were given a chance to ask any questions they had at this time. The experimenter made notations regarding the condition, time and date of the experiment on an experiment information form.

The experimenter then left the room and allowed the team to complete the initial three years of the business simulation program (COFI). The program provided feedback reports on screen every season and the participants had scratch paper if they wished to privately record these data. After the team completed the initial three years, the experimenter re-entered the room and took each individual one at a time into an adjacent room for their performance appraisal. The appraisal was based on COFI output which the experimenter accessed via computer and recorded on the experiment information form. Depending on condition and performance they were appraised (see Appendix F for the performance appraisal scripts) and which appraisal they received was also recorded. After the appraisal, they filled out a survey including manipulation priming and MTFQ items (see Appendix D). Then the experimenter collected the surveys and left the room again to allow them to complete a final three years of the business simulation task (COFI).

When the team completed this the experimenter came back into the room administered a final survey, including the task description item and the MTFQ (see

Appendix E). Participants were then given a debriefing form which was reviewed with the experimenter along with a verbal debriefing (see Appendix G). Participants were then dismissed. Once all data were collected, each condition was analyzed to determine which participants had the highest appropriate profit to receive the rewards. These participants were notified by e-mail and arrangements were made for them to collect the rewards. After rewards were collected identifying information was removed from the data file. The final performance information for the entire experiment was saved with the appropriate date, time, and condition of the experiment as well as printed in hard copy. This information was also recorded on the experiment information form to allow for later verification.

CHAPTER THREE

RESULTS

Initial Analyses

Descriptive statistics were obtained for the three main variables of interest by condition and are presented here in Table 1.

Variable	Individual Perf. App.	Dual Perf. App.	Team Perf. App.
Team Orientation	*M* = 4.891	*M* = 4.813	*M* = 4.646
	SD =0.395	*SD* = 0.048	*SD* = 0.415
Mutual Trust	*M* = 4.593	*M* = 4.25	*M* = 3.815
	SD = 0.465	*SD* = 0.624	*SD* = 0.439
Team Performance	*M* = -$ 88,121.333	*M* = $ 7,754.500	*M* = -$ 308,490.167
	SD = $ 210,718.00	*SD* = $ 71,052.752	*SD* = $ 651,093.00

Table 1: Descriptive statistics by condition

The manipulation check questions answered prior to the surveys were shown to have the expected responses (Survey 1: $\chi^2 = .000$, $df = 2$, $p < 0.001$, Survey 2: $\chi\ \chi^2 = .000$, $df = 2$, $p < 0.001$).

Tests of Hypotheses

Each of the three main hypotheses was focused on the type of performance appraisal having significant effects on teamwork factors. The variables of concern were team orientation, mutual trust, and team performance. *Hypothesis 1* proposed that team orientation would be higher in the team and dual performance appraisal conditions. A repeated measures ANOVA found a significant main effect for condition, $F(2,153) = 4.99$, $p = .008$. Tukey

post-hoc comparisons of the three conditions indicate that those in the individual condition (M = 4.112) had significantly higher team orientation scores than those in the team (M = 3.949) performance appraisal condition. Other comparisons between the conditions were not statistically significant at $p < .05$. This indicates that those expecting an individual appraisal also felt the most strongly oriented towards teamwork at this stage of the task. It is interesting to note that this relationship is opposite from what was expected based on the review of the literature. Some possible explanations for this unanticipated finding are contained in the discussion.

Similarly, *Hypothesis 2* stated that mutual trust would be significantly greater in the team and dual conditions than in the individual performance appraisal condition. A repeated-measures ANOVA revealed significant differences in mutual trust between conditions, F (2, 102) = 20.11, $p < .001$. Tukey post-hoc comparisons revealed that those in the individual condition (M = 4.593) had significantly higher mutual trust than those in the team (M = 3.815, $p < .001$) and dual (M = 4.250, $p = .0173$) performance appraisal conditions. Mutual trust was also significantly higher in the dual condition versus the team condition (p = .002). The differences in mutual trust for the individual and dual conditions were not significantly different. This indicates that those expecting an individual appraisal also felt the most trust towards their teammates at this stage of the task. It is

interesting to note that this relationship is opposite from what was expected based on the review of the literature. Some possible explanations for these unanticipated findings are contained in the discussion.

Hypothesis 3 proposed that team performance would be significantly higher in the team appraisal condition than in the individual and dual appraisal conditions. Team performance was conceptualized as the overall company profit achieved in the business simulation task. A repeated measures ANOVA was run on performance in the task and was not significant for condition, F (2, 32) = 1.67, p = .204, or time, F (1, 32) = .03, p =.867. Thus, *Hypothesis 3* was not supported. A one-way ANOVA was run on the final 2 years of performance data as a final measure to support that the lack of findings were consistent even once the manipulation should have been in full effect, the lack of findings were supported; F (2,15) = 1.83, p = .193.

In summary, none of the formal hypotheses were supported. However, the findings and further analyses contained in the discussion have interesting implications for both the team and performance appraisal literature.

Word Analysis

For the open ended task description question ("Please provide a quick description of how you and your team completed the tasks", see Appendix E), a word analysis for the

number of I and Team oriented words by condition was intended. I words were conceptualized as the following: I, my, each (where it referred to tasks individually done), individually, one, person, members. Team words were conceptualized as the following: We, our, team , everyone, teammates, us. The times these words were used in the open ended responses were tallied, and were divided by the total number of words in the response. Nine participants in the dual performance appraisal condition chose not to answer this particular question, though all other participants provided some form of response. Many of the responses were focused on backup behaviors and other variables related to the MTFQ, possibly due to unintended priming effects. Despite these issues a one-way ANOVA was run on the descriptive results which are presented here in Table 2.

Condition	Frequency of 'I' words	Frequency of 'Team' words
Individual	0.03	0.101
Dual	0.036	0.078
Team	0.005	0.098

Table 2: Word Analysis Frequencies

No significant differences were found for I or Team words by condition, I: F (2,42) = 3.22, p =.079, T: F (2,42) = .807, p = .453.

Exploratory Analyses

A repeated measures ANOVA was run for the following variables: individual performance, team leadership (TL), mutual performance monitoring (MPM), backup behavior (BB), adaptability (A), shared mental models (SMM), and closed loop communication (CLC). Please note that because these analyses were purely exploratory adjustments were not made for experiment-wise error rate.

Significant differences in individual performance between conditions were revealed, F (2, 102) = 13.38, p < .001. Tukey post-hoc comparisons showed that those in the individual condition (M = $-13,765) had significantly higher individual performance than those in the team (M = $-52,581, p = .013) condition and almost significantly lower than those in the dual (M = $16967, p = .063) performance appraisal condition. Individual performance was also significantly higher in the dual condition versus the team condition (p < .001).

Significant differences in team leadership (TL; higher scores indicating more leadership) between conditions were revealed, F (2, 102) = 7.84, p = .001. Tukey post-hoc comparisons showed that those in the dual condition (M = 4.81) had significantly higher TL than those in the team (M = 4.53, p = .0004) condition.

Mutual performance monitoring (MPM) experienced a significant main effect for time, F (1, 102) = 98.11, p < .001. Tukey post-hoc comparisons revealed that MPM after the initial task period (M = 4.681) was significantly higher than scores after task completion (M = 3.744, p < .001).

Significant differences in backup behaviors (BB) between conditions were revealed, F (2, 102) = 7.27, p = .001. Tukey post-hoc comparisons showed that those in the individual condition (M = 3.873) had significantly higher BB than those in the dual (M = 3.717, p = .0007) condition.

Significant differences in adaptability (A) between conditions were revealed, F (2, 102) = 4.21, p = .017. Tukey post-hoc comparisons showed that those in the individual condition (M = 3.956) had significantly higher A than those in the team (M = 3.533, p =

.033) condition. A was also significantly lower in the team condition versus the dual condition (M = 3.944, p = .039).

Significant differences in shared mental models (SMM) between conditions were revealed, F (2, 102) = 3.15, p = .047. Tukey post-hoc comparisons showed that those in the individual condition (M = 4.519) had significantly higher SMM than those in the team (M = 4.185, p = .049) condition.

Significant differences in closed loop communication (CLC) between conditions were revealed, F (2, 102) = 16.65, p < .001. Tukey post-hoc comparisons showed that those in the individual condition (M = 4.537) had significantly higher CLC than those in the dual (M = 4.111, p =.002) and team(M = 3.861, p < .001) conditions.

A final set of analyses was conducted using one-way ANOVAs to see if negative performance (measured by categorizing those with a negative profit change from time one to time two versus those with a positive profit change) and negative performance appraisals had effects on the main variables of interest. No significant differences were found on team performance, team orientation, or mutual trust for either negative performance or negative performance appraisals. Mutual trust at time 2 was the only variable approaching significant differences based on negative performance, F (1,52) = 3.69, p =.060 (negative performance M =4.02, positive performance M =4.36). Two of the exploratory variables also experienced similar effects as seen in Table 3.

Variable	**Neg. Perf. *M*** *N = 15*	**Pos. Perf. *M*** *N = 39*	***F* information**	***P***
A (Time 2)	3.28	4.16	F (1,52) = 14.16	< .001
BB (Time 2)	3.48	3.76	F (1,52) = 5.09	.028

Table 3: Negative Performance Effects

CHAPTER FOUR

DISCUSSION

The present research study sought to further the team literature particularly in regards to performance appraisals and rewards. It was hypothesized that performance appraisals that emphasized the team performance would enhance teamwork and team performance. Specifically this meant that it was hypothesized that team performance would be significantly highest in the team appraisal condition and that team orientation and mutual trust would be significantly higher in the team and dual conditions compared to the individual performance appraisal condition. However, repeated measures ANOVAs run on data collected from 18 teams comprised of 54 individuals indicated that teamwork was not enhanced by the expected types of appraisal (dual and team) but instead was enhanced by an individual appraisal. Because none of the hypotheses were supported, it is important to note potential reasons as to why the proposed results were not significant.

One of the major findings of this study is that performance appraisal condition did have significant effects on many teamwork processes (team orientation, mutual trust, team leadership, backup behaviors, adaptability, shared mental models, and closed loop communication) and on individual performance. While these effects were not as hypothesized, they do support the assumption that the manipulation was effective and that performance appraisal and rewards of individuals in teams are a very important consideration for organizations.

The task was a team task which required teamwork no matter what condition individuals were in (they still had to make team decisions regarding administration and

research and development and had to agree on the whole before implementing the budget even if they had individual product responsibilities). This was as intended, however it may have some implications for the findings of this study. According to our study, team orientation was significantly higher in the individual condition than in the team condition. Therefore one possible explanation for this finding is that those in the individual condition had the highest goal congruence with their teammates, which increased their team orientation. This could also explain why mutual trust was significantly higher in the individual condition than in either the team or dual performance appraisal condition. Goal congruence may have been enhanced by the individual component of the overall team task which in turn enhanced this component of teamwork for that condition.

One of the other major findings of this study is that there was a large amount of performance variability across all conditions – which indicates that this task did provide the potential for both good and bad performance in all conditions. However, one possible issue with these performance measures is the fact that individuals had the potential to perform higher than teams, simply due to profit as the measure of performance. In order for a team to have a profit, they needed to have an overall company profit which means that there were other factors involved beyond simply production and sales and marketing costs like in the individual product profits. Team profits in general may have been exponentially more difficult to achieve than individual profits, though they were not intended to be. Another profit note is that product B had more profit potential than A and C because it had the highest profit in a season in which it had no competition from the other products. This unintentionally provided individuals with this product with a higher possibility for profit and rewards and should be corrected in the future if this program were to be used for this type

of task again. Due to the method of data output from the program it was not possible to statistically control for these issues with product B. This also could have inflated the individual profit variability.

Now that the potential program and design issues which may have resulted in the lack of findings regarding team performance have been addressed, the possible theoretical reasoning behind these findings are as follows. Team performance was highest in the dual condition and that was the only condition that had a positive mean for company profits, however it was not significantly different from the other conditions. This could mean that despite the indication of the power analysis, a higher sample size would net significant results. Another possible explanation is that there were other factors at work which were not measured or tested for, such as goal acceptance, goal congruence, task interdependence, task complexity, role and task ambiguity, and team motivation (Geister, Konradt & Hertel, 2006; Locke & Latham, 1990; Salas, Sims, & Burke, 2005; van Vijfeijken, Kleingelf, van Tuijl, Algera, & Thierry, 2004). An example of how these variables could have impacted this study's results based on the findings of previous studies is as follows: goal acceptance and congruence may have been increased in the individual condition which should increase performance, but task complexity may have also increased which should lower performance. In effect these variables could have neutralized one another and been why team performance did not mirror the findings of the other teamwork variables (which were that those in the individual condition generally had higher scores).

These findings could also be due to the fact that for this task performance was not significantly greater at the team level in any condition. Those in the individual condition were unconcerned with the company profits, resulting in low profits. Those in the dual

condition, even when they observed the pattern for making larger profits usually still wanted some money to go towards their individual product, which in turn reduced the company profits. Those in the team condition seemed to have a more difficult time discerning the pattern which resulted in profits (possibly due to it being a function of the individual products) which resulted in lower team profits. A final point in regards to team performance is that it is a very realistic possibility that individual performance in a team does not translate to profits for the company.

As noted in the literature review previous findings regarding team goals, motivation, feedback, and performance appraisals have been contradictory up to this point. It does remain possible that individual performance appraisals are the most effective for enhancing teamwork.

While none of the hypotheses were supported, future research may benefit from conducting a similar study that addresses possible limitations in the current study. Using an actual work sample of work teams with performance and performance appraisal data to retest the original hypotheses would be preferred. However, if this task were to be used again, particular attention should be paid to the programming of the profits and the issues mentioned above should be addressed (Product B having higher profit potential, possible issued with generating overall company profit). Finally, other variables of interest which have been previously studied and found to have performance effects should be added into the study (i.e. goal congruence, team motivation, team satisfaction, task complexity, task interdependence, and task and role ambiguity).

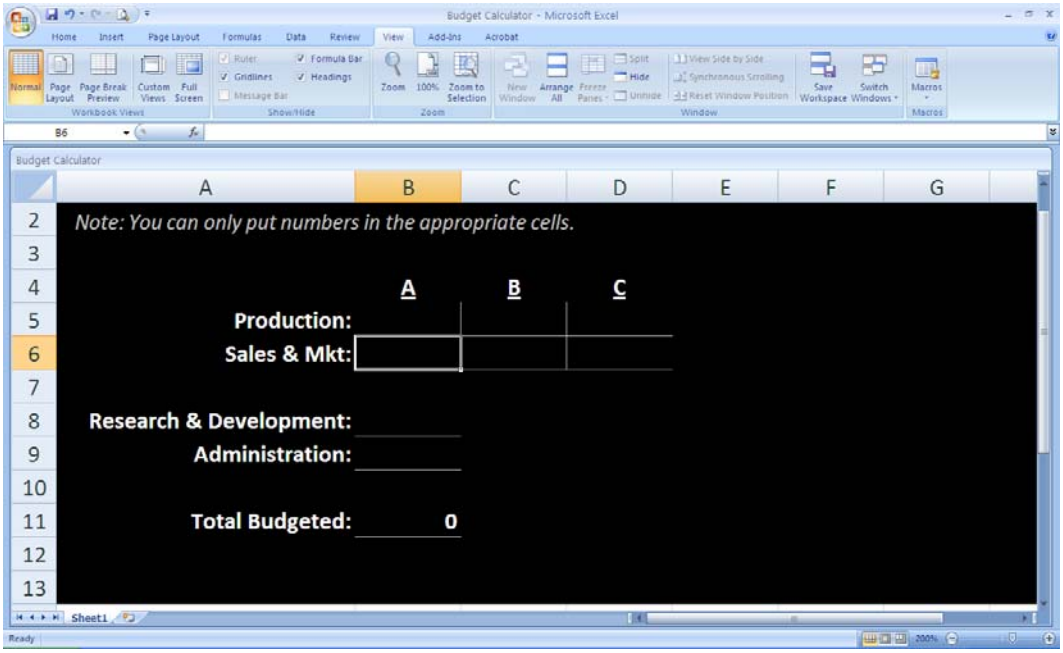
APPENDICES

Product Sales History

Product A:			Product B:			Product C:		
Year	Season	Total Sales	Year	Season	Total Sales	Year	Season	Total Sales
2004	1	$ 50,500.00	2004	1	$ 56,500.00	2004	1	$ 52,000.00
	2	$ 54,500.00		2	$ 52,000.00		2	$ 58,500.00
	3	$ 57,000.00		3	$ 48,500.00		3	$ 56,000.00
	4	$ 52,500.00		4	$ 56,500.00		4	$ 48,500.00
2005	1	$ 50,000.00	2005	1	$ 58,500.00	2005	1	$ 56,000.00
	2	$ 57,000.00		2	$ 52,500.00		2	$ 58,000.00
	3	$ 60,000.00		3	$ 53,000.00		3	$ 52,500.00
	4	$ 56,000.00		4	$ 55,000.00		4	$ 50,500.00
2006	1	$ 50,000.00	2006	1	$ 57,500.00	2006	1	$ 57,000.00
	2	$ 54,500.00		2	$ 53,000.00		2	$ 55,500.00
	3	$ 59,500.00		3	$ 48,500.00		3	$ 55,500.00
	4	$ 56,000.00		4	$ 55,000.00		4	$ 53,000.00
2007	1	$ 48,500.00	2007	1	$ 59,000.00	2007	1	$ 54,500.00
	2	$ 54,500.00		2	$ 55,500.00		2	$ 56,500.00
	3	$ 56,500.00		3	$ 51,000.00		3	$ 55,000.00
	4	$ 53,000.00		4	$ 53,000.00		4	$ 53,500.00
2008	1	$ 49,000.00	2008	1	$ 60,000.00	2008	1	$ 55,000.00
	2	$ 56,000.00		2	$ 56,000.00		2	$ 57,500.00
	3	$ 57,000.00		3	$ 52,000.00		3	$ 55,000.00
	4	$ 53,000.00		4	$ 53,000.00		4	$ 49,000.00

General note: Most businesses like yours allocate 3-10% to Administration (to keep production running smoothly) and up to 5% to Research & Development (to remain competitive in the market). Note that these are percentages of production costs – not your total budget.

Appendix B: Excel Calculator Screenshot



Appendix C: Initial Survey (with scoring notes)

Initial Survey

This questionnaire asks about your team orientation. Please *circle* the number that best describes your opinion.

	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree
1. I like working with other people.	1	2	3	4	5
2. I could probably do better at most tasks by myself.(R)	1	2	3	4	5
3. I trust when I work in teams that we will all do our best.	1	2	3	4	5
4. I generally enjoy working in a team situation.	1	2	3	4	5
5. I expect that my team will work well together.	1	2	3	4	5
6. Larger teams are usually worse for a task, two people is usually enough.(R)	1	2	3	4	5
7. I expect that my team members will have some useful skills I don't have.	1	2	3	4	5
8. I'm ok with the fact that when I do teamwork I get judged as a team, rather than as individuals.	1	2	3	4	5

Please answer the following questions about your fellow team members:

Have you shared a class?	Yes, 1 of them	Yes, both of them	No
If you had a party, would you invite them?	Yes, 1 of them	Yes, both of them	No

Please answer the following questions about yourself:

Name:	
Major:	
E-mail:	
Current Time & Date:	

Appendix D: Second Survey (with scoring notes)

Surveys: Post Simulation I

Please check whichever statement applies:
_____ I will be assessed on my individual performance.
_____ We will be assessed on the team's performance

This questionnaire asks about various aspects of working in a team. Please *circle* the number that best describes your opinion.

The Modified Team Factors Questionnaire	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree
1. I was so focused on my own actions it was hard to keep track of what my teammates were doing. (MPM 1-R)	1	2	3	4	5
2. I felt like my team was able to change our strategy when the situation changed. (A 1)	1	2	3	4	5
3. My team members and I exhibited good leadership skills when it was necessary. (TL 1)	1	2	3	4	5
4. I like working with other people. (TO 1)	1	2	3	4	5
5. My teammates came to my aid whenever I needed help. (BB 1)	1	2	3	4	5
6. At least one person in our team was good at coordinating our actions. (TL 2)	1	2	3	4	5
7. I knew that my teammates would do what they said they would. (MT 1)	1	2	3	4	5
8. For most of this task we were all "on the same page". (SMM 1)	1	2	3	4	5
9. I could probably do better at most tasks by myself. (TO 2-R)	1	2	3	4	5
10. We usually had an alternative plan when something went wrong. (A 2)	1	2	3	4	5
11. My team lacked firm leadership. (TL 3)	1	2	3	4	5
12. It's not my job to do my teammates' work.(BB 2-R)	1	2	3	4	5
13. I was aware of it when someone else made a mistake. (MPM 2)	1	2	3	4	5
14. My team and I communicated effectively. (CLC 1)	1	2	3	4	5
15. I trust when I work in teams that we will all do our best. (TO 3)	1	2	3	4	5
16. When a team member is overloaded I'm typically able to help them. (BB 3)	1	2	3	4	5
17. It was hard for us to change our tactics when things did not go as we expected. (A 3-R)	1	2	3	4	5
18. My team had a hard time seeing things from my perspective. (SMM 2-R)	1	2	3	4	5
19. My team had a high level of trust in each other. (MT 2)	1	2	3	4	5
20. I generally enjoy working in a team situation. (TO 4)	1	2	3	4	5
21. We usually looked to one person to make the most important decisions. (TL 4)	1	2	3	4	5

Date & Time: _____

22. I was usually aware of how my teammates were performing as we went through the task. (MPM 3)	1	2	3	4	5
23. We usually overcome unexpected obstacles. (A 4)	1	2	3	4	5
24. It's not my job to do my teammates' work. (BB 4)	1	2	3	4	5
25. I expect that my team will work well together. (TO 5)	1	2	3	4	5
26. My team and I usually had the same opinions about what to do. (SMM 3)	1	2	3	4	5
27. I'm more concerned about completing my tasks than what other team members are doing. (MPM 4-R)	1	2	3	4	5
28. We had good non-verbal communication. (CLC 2)	1	2	3	4	5
29. Larger teams are usually worse for a task, two people is usually enough. (TO 6-R)	1	2	3	4	5
30. My teammates trusted me with important tasks. (MT 3)	1	2	3	4	5
31. I usually knew what my teammates were doing. (MPM 5)	1	2	3	4	5
32. If a team member is overloaded I'm usually willing to help them. (BB 5)	1	2	3	4	5
33. We were good at giving each other feedback. (CLC 3)	1	2	3	4	5
34. I expect that my team members will have some useful skills I don't have. (TO 7)	1	2	3	4	5
35. My teammates looked to me for cues and ideas.(TL 5)	1	2	3	4	5
36. I was comfortable changing our plan quickly. (A 5)	1	2	3	4	5
37. I'm ok with the fact that when I do teamwork I get judged as a team, rather than as individuals. (TO 8)	1	2	3	4	5

Appendix E: Third Survey

Surveys: Post Simulation II

Please check whichever statement applies:

____ In this scenario, the experimenter's evaluation of our performance was based on the team's performance.

____ In this scenario, the experimenter's evaluation of my performance was based on my individual performance.

Please provide a quick description of how you and your team completed the tasks. If you need more space, use the backside of this page.

This questionnaire asks about various aspects of working in a team. Please *circle* the number that best describes your opinion.

The Modified Team Factors Questionnaire	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree
38. I was so focused on my own actions it was hard to keep track of what my teammates were doing.	1	2	3	4	5
39. I felt like my team was able to change our strategy when the situation changed.	1	2	3	4	5
40. My team members and I exhibited good leadership skills when it was necessary.	1	2	3	4	5
41. I like working with other people.	1	2	3	4	5
42. My teammates came to my aid whenever I needed help.	1	2	3	4	5
43. At least one person in our team was good at coordinating our actions.	1	2	3	4	5
44. I knew that my teammates would do what they said they would.	1	2	3	4	5
45. For most of this task we were all "on the same page".	1	2	3	4	5
46. I could probably do better at most tasks by myself.	1	2	3	4	5
47. We usually had an alternative plan when something went wrong.	1	2	3	4	5
48. My team lacked firm leadership.	1	2	3	4	5
49. It's not my job to do my teammates' work.	1	2	3	4	5

Date & Time: _____

50. I was aware of it when someone else made a mistake.	1	2	3	4	5
51. My team and I communicated effectively.	1	2	3	4	5
52. I trust when I work in teams that we will all do our best.	1	2	3	4	5
53. When a team member is overloaded I'm typically able to help them.	1	2	3	4	5
54. It was hard for us to change our tactics when things did not go as we expected.	1	2	3	4	5
55. My team had a hard time seeing things from my perspective.	1	2	3	4	5
56. My team had a high level of trust in each other.	1	2	3	4	5
57. I generally enjoy working in a team situation.	1	2	3	4	5
58. We usually looked to one person to make the most important decisions.	1	2	3	4	5
59. I was usually aware of how my teammates were performing as we went through the task.	1	2	3	4	5
60. We usually overcame unexpected obstacles.	1	2	3	4	5
61. It's not my job to do my teammates' work.	1	2	3	4	5
62. I expect that my team will work well together.	1	2	3	4	5
63. My team and I usually had the same opinions about what to do.	1	2	3	4	5
64. I'm more concerned about completing my tasks than what other team members are doing.	1	2	3	4	5
65. We had good non-verbal communication.	1	2	3	4	5
66. Larger teams are usually worse for a task, two people is usually enough.	1	2	3	4	5
67. My teammates trusted me with important tasks.	1	2	3	4	5
68. I usually knew what my teammates were doing.	1	2	3	4	5
69. A team member is overloaded I'm usually willing to help them.	1	2	3	4	5
70. We were good at giving each other feedback.	1	2	3	4	5
71. I expect that my team members will have some useful skills I don't have.	1	2	3	4	5
72. My teammates looked to me for cues and ideas.	1	2	3	4	5
73. I was comfortable changing our plan quickly.	1	2	3	4	5
74. I'm ok with the fact that when I do teamwork I get judged as a team, rather than as individuals.	1	2	3	4	5

Thank you for your participation and your help in furthering our understanding of teams!

You will be debriefed in a few minutes.

We will notify you of your reward status once the experiment is complete.

Appendix F: Performance Appraisal Scripts

Condition	**Good Performance** = Profit	**Bad Performance** = Loss
Team Appraisal	The team has performed very well and you all are contenders to receive the team reward at the completion of this study.	Your team has not done very well. If performance continues like this the team will be ineligible for the reward at the completion of this study.
Individual Appraisal	You have done very well with your product. You are a contender to receive the reward at the completion of this study.	You have not done very well with your product. If you don't improve your performance you will be ineligible for the reward at the completion of this study.
Dual: Team & Individual Appraisal	*Both of the applicable responses above will be applied.* *EX: If the team performs well, they will get the good performance feedback. But the individual performed badly, so they get bad performance feedback separately.*	

If they get a bad review and ask how to improve performance say this: You should review the past performance figures for and see if you can find a pattern there to help you improve.

Appendix G: Debriefing Form

Debriefing:

Thank you for participating in this research study. You have helped increase the knowledge of teamwork and performance appraisal.

This study was an examination of how different types of performance appraisals affect teamwork variables. Generally employees are appraised individually no matter what type of work they actually do in their job. This could be one of the reasons why teams do not perform the way that organizations expect them to. Performance appraisals are often used as a method of rewarding and reinforcing behaviors that organizations want their employees to engage in – but if they are rewarding only individual performance then team performance could be suffering. This is what our hypotheses reflected – this idea that individual performance appraisals undermine teamwork variables. To test this hypothesis, some of you were appraised individually, some as a team, and some both as a team and individuals. Your results, along with those of the rest of the participants, will be analyzed in order to draw conclusions.

If you'd like more information regarding teamwork please see:

Salas, E., Sims, D., & Burke, C. (2005). Is there a 'Big Five' in Teamwork?. *Small Group Research*, *36*(5), 555-599.

Thank you so much for your participation!

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